

$f_0(980)$ $I^G(J^{PC}) = 0^+(0^{++})$

See also the minireview on scalar mesons under $f_0(600)$. (See the index for the page number.)

 $f_0(980)$ MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
980 ±10 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
976.8 ± 0.3 ^{+10.1} _{-0.6}	64k	¹ AMBROSINO 07	KLOE	$1.02 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
984.7 ± 0.4 ^{+2.4} _{-3.7}	64k	² AMBROSINO 07	KLOE	$1.02 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
985.6 ± 1.2 ^{+1.1} _{-1.6}		³ MORI 07	BELL	$10.6 e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$
983.0 ± 0.6 ^{+4.0} _{-3.0}		⁴ AMBROSINO 06B	KLOE	$1.02 e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
977.3 ± 0.9 ^{+3.7} _{-4.3}		⁵ AMBROSINO 06B	KLOE	$1.02 e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
950 ± 9	4286	⁶ GARMASH 06	BELL	$B^+ \rightarrow K^+ \pi^+ \pi^-$
965 ± 10		ABLIKIM 05	BES2	$J/\psi \rightarrow \phi \pi^+ \pi^-$, $\phi K^+ K^-$
1031 ± 8		⁷ ANISOVICH 03	RVUE	
1037 ± 31		TIKHOIROV 03	SPEC	$40.0 \pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
973 ± 1	2438	⁸ ALOISIO 02D	KLOE	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
977 ± 3 ± 2	848	⁹ AITALA 01A	E791	$D_s^+ \rightarrow \pi^- \pi^+ \pi^+$
969.8 ± 4.5	419	¹⁰ ACHASOV 00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
985 ⁺¹⁶ ₋₁₂	419	^{11,12} ACHASOV 00H	SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
976 ± 5 ± 6		¹³ AKHMETSHIN 99B	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$
977 ± 3 ± 6	268	¹³ AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
975 ± 4 ± 6		¹⁴ AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
975 ± 4 ± 6		¹⁵ AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$
985 ± 10		BARBERIS 99	OMEG	$450 p p \rightarrow p_s p_f K^+ K^-$
982 ± 3		BARBERIS 99B	OMEG	$450 p p \rightarrow p_s p_f \pi^+ \pi^-$
982 ± 3		BARBERIS 99C	OMEG	$450 p p \rightarrow p_s p_f \pi^0 \pi^0$
987 ± 6 ± 6		¹⁶ BARBERIS 99D	OMEG	$450 p p \rightarrow K^+ K^-$, $\pi^+ \pi^-$
989 ± 15		BELLAZZINI 99	GAM4	$450 p p \rightarrow p p \pi^0 \pi^0$
991 ± 3		¹⁷ KAMINSKI 99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\bar{K}$, $\sigma\sigma$
~ 980		¹⁷ OLLER 99	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\bar{K}$
~ 993.5		OLLER 99B	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\bar{K}$
~ 987		¹⁷ OLLER 99C	RVUE	$\pi\pi \rightarrow \pi\pi$, $K\bar{K}$, $\eta\eta$
957 ± 6		¹⁸ ACKERSTAFF 98Q	OPAL	$Z \rightarrow f_0 X$
960 ± 10		ALDE 98	GAM4	
1015 ± 15		¹⁷ ANISOVICH 98B	RVUE	Compilation

1008		¹⁹ LOCHER	98	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
955 \pm 10		¹⁸ ALDE	97	GAM2	$450 pp \rightarrow pp\pi^0\pi^0$
994 \pm 9		²⁰ BERTIN	97C	OBLX	$0.0 \bar{p}p \rightarrow \pi^+\pi^-\pi^0$
993.2 \pm 6.5 \pm 6.9		²¹ ISHIDA	96	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
1006		TORNQVIST	96	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}, K\pi,$ $\eta\pi$
997 \pm 5	3k	²² ALDE	95B	GAM2	$38 \pi^- p \rightarrow \pi^0\pi^0 n$
960 \pm 10	10k	²³ ALDE	95B	GAM2	$38 \pi^- p \rightarrow \pi^0\pi^0 n$
994 \pm 5		AMSLER	95B	CBAR	$0.0 \bar{p}p \rightarrow 3\pi^0$
\sim 996		²⁴ AMSLER	95D	CBAR	$0.0 \bar{p}p \rightarrow \pi^0\pi^0\pi^0,$ $\pi^0\eta\eta, \pi^0\pi^0\eta$
987 \pm 6		²⁵ ANISOVICH	95	RVUE	
1015		JANSSEN	95	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
983		²⁶ BUGG	94	RVUE	$\bar{p}p \rightarrow \eta 2\pi^0$
973 \pm 2		²⁷ KAMINSKI	94	RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$
988		²⁸ ZOU	94B	RVUE	
988 \pm 10		²⁹ MORGAN	93	RVUE	$\pi\pi(K\bar{K}) \rightarrow \pi\pi(K\bar{K}),$ $J/\psi \rightarrow \phi\pi\pi(K\bar{K}),$ $D_s \rightarrow \pi(\pi\pi)$
971.1 \pm 4.0		¹⁸ AGUILAR-...	91	EHS	$400 pp$
979 \pm 4		³⁰ ARMSTRONG	91	OMEG	$300 pp \rightarrow pp\pi\pi,$ $ppK\bar{K}$
956 \pm 12		BREAKSTONE	90	SFM	$pp \rightarrow pp\pi^+\pi^-$
959.4 \pm 6.5		¹⁸ AUGUSTIN	89	DM2	$J/\psi \rightarrow \omega\pi^+\pi^-$
978 \pm 9		¹⁸ ABACHI	86B	HRS	$e^+e^- \rightarrow \pi^+\pi^- X$
985.0 \pm 9.0	-39.0	ETKIN	82B	MPS	$23 \pi^- p \rightarrow n2K_S^0$
974 \pm 4		³⁰ GIDAL	81	MRK2	$J/\psi \rightarrow \pi^+\pi^- X$
975		³¹ ACHASOV	80	RVUE	
986 \pm 10		³⁰ AGUILAR-...	78	HBC	$0.7 \bar{p}p \rightarrow K_S^0 K_S^0$
969 \pm 5		³⁰ LEEPER	77	ASPK	$2-2.4 \pi^- p \rightarrow$ $\pi^+\pi^- n, K^+K^- n$
987 \pm 7		³⁰ BINNIE	73	CNTR	$\pi^- p \rightarrow n\text{MM}$
1012 \pm 6		³² GRAYER	73	ASPK	$17 \pi^- p \rightarrow \pi^+\pi^- n$
1007 \pm 20		³² HYAMS	73	ASPK	$17 \pi^- p \rightarrow \pi^+\pi^- n$
997 \pm 6		³² PROTOPOP...	73	HBC	$7 \pi^+ p \rightarrow \pi^+ p\pi^+\pi^-$

¹In the kaon-loop fit.²In the no-structure fit.³Breit-Wigner mass. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0}^2 KK/g_{f_0}^2 \pi\pi$ from ABLIKIM 05.⁴In the kaon-loop fit following formalism of ACHASOV 89.⁵In the no-structure fit assuming a direct coupling of ϕ to $f_0\gamma$.⁶FLATTE 76 parameterization. Supersedes GARMASH 05.⁷K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0\pi^0 n$, $\pi^- p \rightarrow K\bar{K}n$, $\pi^+\pi^- \rightarrow \pi^+\pi^-$, $\bar{p}p \rightarrow \pi^0\pi^0\pi^0$, $\pi^0\eta\eta$, $\pi^0\pi^0\eta$, $\pi^+\pi^-\pi^0$, $K^+K^-\pi^0$, $K_S^0 K_S^0\pi^0$, $K^+K_S^0\pi^-$ at rest, $\bar{p}n \rightarrow \pi^-\pi^-\pi^+$, $K_S^0 K^- \pi^0$, $K_S^0 K_S^0\pi^-$ at rest.⁸From the negative interference with the $f_0(600)$ meson of AITALA 01B using the ACHASOV 89 parameterization for the $f_0(980)$, a Breit-Wigner for the $f_0(600)$, and ACHASOV 01F for the $\rho\pi$ contribution.⁹Coupled-channel Breit-Wigner, couplings $g_\pi = 0.09 \pm 0.01 \pm 0.01$, $g_K = 0.02 \pm 0.04 \pm 0.03$.

- 10 Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
 11 Supersedes ACHASOV 98I.
 12 In the “narrow resonance” approximation.
 13 Assuming $\Gamma(f_0) = 40$ MeV.
 14 From a narrow pole fit taking into account $f_0(980)$ and $f_0(1200)$ intermediate mechanisms.
 15 From the combined fit of the photon spectra in the reactions $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.
 16 Supersedes BARBERIS 99 and BARBERIS 99B
 17 T-matrix pole.
 18 From invariant mass fit.
 19 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(1039 - 93i)$ MeV.
 20 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(963 - 29i)$ MeV.
 21 Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
 22 At high $|t|$.
 23 At low $|t|$.
 24 On sheet II in a 4-pole solution, the other poles are found on sheet III at $(953 - 55i)$ MeV and on sheet IV at $(938 - 35i)$ MeV.
 25 Combined fit of ALDE 95B, ANISOVICH 94, AMSLER 94D.
 26 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(996 - 103i)$ MeV.
 27 From sheet II pole position.
 28 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(797 - 185i)$ MeV and can be interpreted as a shadow pole.
 29 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(978 - 28i)$ MeV.
 30 From coupled channel analysis.
 31 Coupled channel analysis with finite width corrections.
 32 Included in AGUILAR-BENITEZ 78 fit.
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$f_0(980)$ WIDTH

Width determination very model dependent. Peak width in $\pi\pi$ is about 50 MeV, but decay width can be much larger.

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
40 to 100 OUR ESTIMATE				
• • • We do not use the following data for averages, fits, limits, etc. • • •				
51.3 ^{+ 20.8 + 13.2} — 17.7 — 3.8	33 MORI	07 BELL	$10.6 e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$	
61 ± 9 ± 14 — 8	2584	34 GARMASH	05 BELL	$B^+ \rightarrow K^+ \pi^+ \pi^-$
64 ± 16		35 ANISOVICH	03 RVUE	
121 ± 23		TIKHOMIROV 03	SPEC	$40.0 \pi^- C \rightarrow K_S^0 K_S^0 K_L^0 X$
~ 70	36 BRAMON	02 RVUE	$1.02 e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$	
44 ± 2 ± 2	848	37 AITALA	01A E791	$D_s^+ \rightarrow \pi^- \pi^+ \pi^+$
201 ± 28	419	38 ACHASOV	00H SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
122 ± 13	419	39,40 ACHASOV	00H SND	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
56 ± 20		41 AKHMETSHIN 99C	CMD2	$e^+ e^- \rightarrow \pi^0 \pi^0 \gamma$
65 ± 20		BARBERIS	99 OMEG	$p_p \rightarrow p_s p_f K^+ K^-$
80 ± 10		BARBERIS	99B OMEG	$p_p \rightarrow p_s p_f \pi^+ \pi^-$

80 \pm 10		BARBERIS	99C	OMEG	450 $p p \rightarrow p_s p_f \pi^0 \pi^0$
48 \pm 12 \pm 8		42 BARBERIS	99D	OMEG	450 $p p \rightarrow K^+ K^-$, $\pi^+ \pi^-$
65 \pm 25		BELLAZZINI	99	GAM4	450 $p p \rightarrow p p \pi^0 \pi^0$
71 \pm 14		43 KAMINSKI	99	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}, \sigma \sigma$
\sim 28		43 OLLER	99	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
\sim 25		OLLER	99B	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
\sim 14		43 OLLER	99C	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}, \eta \eta$
70 \pm 20		ALDE	98	GAM4	
86 \pm 16		43 ANISOVICH	98B	RVUE	Compilation
54		44 LOCHER	98	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
69 \pm 15		45 ALDE	97	GAM2	450 $p p \rightarrow p p \pi^0 \pi^0$
38 \pm 20		46 BERTIN	97C	OBLX	0.0 $\bar{p} p \rightarrow \pi^+ \pi^- \pi^0$
\sim 100		47 ISHIDA	96	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
34		TORNQVIST	96	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}, K\pi, \eta \pi$
48 \pm 10	3k	48 ALDE	95B	GAM2	38 $\pi^- p \rightarrow \pi^0 \pi^0 n$
95 \pm 20	10k	49 ALDE	95B	GAM2	38 $\pi^- p \rightarrow \pi^0 \pi^0 n$
26 \pm 10		AMSLER	95B	CBAR	0.0 $\bar{p} p \rightarrow 3\pi^0$
\sim 112		50 AMSLER	95D	CBAR	0.0 $\bar{p} p \rightarrow \pi^0 \pi^0 \pi^0, \pi^0 \eta \eta, \pi^0 \pi^0 \eta$
80 \pm 12		51 ANISOVICH	95	RVUE	
30		JANSSEN	95	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
74		52 BUGG	94	RVUE	$\bar{p} p \rightarrow \eta 2\pi^0$
29 \pm 2		53 KAMINSKI	94	RVUE	$\pi \pi \rightarrow \pi \pi, K\bar{K}$
46		54 ZOU	94B	RVUE	
48 \pm 12		55 MORGAN	93	RVUE	$\pi \pi(K\bar{K}) \rightarrow \pi \pi(K\bar{K}), J/\psi \rightarrow \phi \pi \pi(K\bar{K}), D_s \rightarrow \pi(\pi \pi)$
37.4 \pm 10.6		45 AGUILAR-...	91	EHS	400 $p p$
72 \pm 8		56 ARMSTRONG	91	OMEG	300 $p p \rightarrow p p \pi \pi, p p K\bar{K}$
110 \pm 30		BREAKSTONE	90	SFM	$p p \rightarrow p p \pi^+ \pi^-$
29 \pm 13		45 ABACHI	86B	HRS	$e^+ e^- \rightarrow \pi^+ \pi^- X$
120 \pm 281 \pm 20		ETKIN	82B	MPS	23 $\pi^- p \rightarrow n 2K_S^0$
28 \pm 10		56 GIDAL	81	MRK2	$J/\psi \rightarrow \pi^+ \pi^- X$
70 to 300		57 ACHASOV	80	RVUE	
100 \pm 80		58 AGUILAR-...	78	HBC	0.7 $\bar{p} p \rightarrow K_S^0 K_S^0$
30 \pm 8		56 LEEPER	77	ASPK	2-2.4 $\pi^- p \rightarrow \pi^+ \pi^- n, K^+ K^- n$
48 \pm 14		56 BINNIE	73	CNTR	$\pi^- p \rightarrow n M M$
32 \pm 10		59 GRAYER	73	ASPK	17 $\pi^- p \rightarrow \pi^+ \pi^- n$
30 \pm 10		59 HYAMS	73	ASPK	17 $\pi^- p \rightarrow \pi^+ \pi^- n$
54 \pm 16		59 PROTOPOP...	73	HBC	7 $\pi^+ p \rightarrow \pi^+ p \pi^+ \pi^-$

- 33 Breit-Wigner $\pi\pi$ width. Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0}^2 K K / g_{f_0}^2 \pi\pi$ from ABLIKIM 05.
- 34 Breit-Wigner, solution 1, PWA ambiguous.
- 35 K-matrix pole from combined analysis of $\pi^- p \rightarrow \pi^0 \pi^0 n$, $\pi^- p \rightarrow K \bar{K} n$, $\pi^+ \pi^- \rightarrow \pi^+ \pi^-$, $\bar{p} p \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$, $\pi^+ \pi^- \pi^0$, $K^+ K^- \pi^0$, $K_S^0 K_S^0 \pi^0$, $K^+ K_S^0 \pi^-$ at rest, $\bar{p} n \rightarrow \pi^- \pi^- \pi^+$, $K_S^0 K^- \pi^0$, $K_S^0 K_S^0 \pi^-$ at rest.
- 36 Using the data of AKHMETSHIN 99c, ACHASOV 00H, and ALOISIO 02D.
- 37 Breit-Wigner width.
- 38 Supersedes ACHASOV 98I. Using the model of ACHASOV 89.
- 39 Supersedes ACHASOV 98I.
- 40 In the “narrow resonance” approximation.
- 41 From the combined fit of the photon spectra in the reactions $e^+ e^- \rightarrow \pi^+ \pi^- \gamma$, $\pi^0 \pi^0 \gamma$.
- 42 Supersedes BARBERIS 99 and BARBERIS 99B
- 43 T-matrix pole.
- 44 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(1039 - 93i)$ MeV.
- 45 From invariant mass fit.
- 46 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(963 - 29i)$ MeV.
- 47 Reanalysis of data from HYAMS 73, GRAYER 74, SRINIVASAN 75, and ROSSELET 77 using the interfering amplitude method.
- 48 At high $|t|$.
- 49 At low $|t|$.
- 50 On sheet II in a 4-pole solution, the other poles are found on sheet III at $(953 - 55i)$ MeV and on sheet IV at $(938 - 35i)$ MeV.
- 51 Combined fit of ALDE 95B, ANISOVICH 94,
- 52 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(996 - 103i)$ MeV.
- 53 From sheet II pole position.
- 54 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(797 - 185i)$ MeV and can be interpreted as a shadow pole.
- 55 On sheet II in a 2 pole solution. The other pole is found on sheet III at $(978 - 28i)$ MeV.
- 56 From coupled channel analysis.
- 57 Coupled channel analysis with finite width corrections.
- 58 From coupled channel fit to the HYAMS 73 and PROTOPOPESCU 73 data. With a simultaneous fit to the $\pi\pi$ phase-shifts, inelasticity and to the $K_S^0 K_S^0$ invariant mass.
- 59 Included in AGUILAR-BENITEZ 78 fit.

f₀(980) DECAY MODES

Mode	Fraction (Γ_i/Γ)
$\Gamma_1 \quad \pi\pi$	dominant
$\Gamma_2 \quad K\bar{K}$	seen
$\Gamma_3 \quad \gamma\gamma$	seen
$\Gamma_4 \quad e^+ e^-$	

$f_0(980)$ PARTIAL WIDTHS **$\Gamma(\gamma\gamma)$**

VALUE (keV)	DOCUMENT ID	TECN	COMMENT	Γ_3
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0.29 $\pm^{+0.07}_{-0.09}$ OUR AVERAGE

0.205 $\pm^{+0.095}_{-0.083}$ $\pm^{+0.147}_{-0.117}$	60 MORI	07 BELL	$10.6 e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$	■
0.28 $\pm^{+0.09}_{-0.13}$	61 BOGLIONE	99 RVUE	$\gamma\gamma \rightarrow \pi^+ \pi^-, \pi^0 \pi^0$	
0.42 $\pm^{+0.06}_{-0.06}$ $\pm^{+0.18}_{-0.18}$	62 OEST	90 JADE	$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$	
• • • We do not use the following data for averages, fits, limits, etc. • • •				
0.29 $\pm^{+0.07}_{-0.07}$ $\pm^{+0.12}_{-0.12}$	63, 64 BOYER	90 MRK2	$e^+ e^- \rightarrow e^+ e^- \pi^+ \pi^-$	
0.31 $\pm^{+0.14}_{-0.14}$ $\pm^{+0.09}_{-0.09}$	63, 64 MARSISKE	90 CBAL	$e^+ e^- \rightarrow e^+ e^- \pi^0 \pi^0$	
0.63 $\pm^{+0.14}_{-0.14}$	65 MORGAN	90 RVUE	$\gamma\gamma \rightarrow \pi^+ \pi^-, \pi^0 \pi^0$	

60 Using finite width corrections according to FLATTE 76 and ACHASOV 05, and the ratio $g_{f_0 K K}^2 / g_{f_0 \pi \pi}^2$ from ABLIKIM 05.

61 Supersedes MORGAN 90.

62 OEST 90 quote systematic errors $\pm^{+0.08}_{-0.18}$. We use ± 0.18 . Observed 60 events.

63 From analysis allowing arbitrary background unconstrained by unitarity.

64 Data included in MORGAN 90, BOGLIONE 99 analyses.

65 From amplitude analysis of BOYER 90 and MARSISKE 90, data corresponds to resonance parameters $m = 989$ MeV, $\Gamma = 61$ MeV. **$\Gamma(e^+ e^-)$**

VALUE (eV)	CL%	DOCUMENT ID	TECN	COMMENT	Γ_4
<8.4	90	VOROBIEV	88	$e^+ e^- \rightarrow \pi^0 \pi^0$	

 $f_0(980)$ BRANCHING RATIOS **$\Gamma(\pi\pi)/[\Gamma(\pi\pi) + \Gamma(K\bar{K})]$** **$\Gamma_1/(\Gamma_1 + \Gamma_2)$**

VALUE	EVTS	DOCUMENT ID	TECN	COMMENT	Γ_4
• • • We do not use the following data for averages, fits, limits, etc. • • •					
0.52 ± 0.12	9.9k	66 AUBERT	060 BABR	$B^\pm \rightarrow K^\pm \pi^\pm \pi^\mp$	■
0.75 $\pm^{+0.11}_{-0.13}$		67 ABLIKIM	05Q BES2	$\chi_{c0} \rightarrow 2\pi^+ 2\pi^-$, $\pi^+ \pi^- K^+ K^-$	
0.84 ± 0.02		68 ANISOVICH	02D SPEC	Combined fit	
~ 0.68		OLLER	99B RVUE	$\pi\pi \rightarrow \pi\pi, K\bar{K}$	
0.67 ± 0.09		69 LOVERRE	80 HBC	$4\pi^- p \rightarrow n2K_S^0$	
0.81 $\pm^{+0.09}_{-0.04}$		69 CASON	78 STRC	$7\pi^- p \rightarrow n2K_S^0$	
0.78 ± 0.03		69 WETZEL	76 OSPK	$8.9\pi^- p \rightarrow n2K_S^0$	

66 Recalculated by us using $\Gamma(K^+ K^-) / \Gamma(\pi^+ \pi^-) = 0.69 \pm 0.32$ from AUBERT 060 and isospin relations.

67 Using data from ABLIKIM 04G.

68 From a combined K-matrix analysis of Crystal Barrel (0. $p\bar{p} \rightarrow \pi^0 \pi^0 \pi^0$, $\pi^0 \eta \eta$, $\pi^0 \pi^0 \eta$), GAMS ($\pi p \rightarrow \pi^0 \pi^0 n$, $\eta \eta n$, $\eta \eta' n$), and BNL ($\pi p \rightarrow K\bar{K} n$) data.

69 Measure $\pi\pi$ elasticity assuming two resonances coupled to the $\pi\pi$ and $K\bar{K}$ channels only.

$f_0(980)$ REFERENCES

AMBROSINO MORI	07	EPJ C49 473 PR D75 051101R	F. Ambrosino <i>et al.</i> T. Mori <i>et al.</i>	(KLOE Collab.) (BELLE Collab.)
AMBROSINO	06B	PL B634 148	F. Ambrosino <i>et al.</i>	(KLOE Collab.)
AUBERT	06O	PR D74 032003	B. Aubert <i>et al.</i>	(BABAR Collab.)
GARMASH	06	PRL 96 251803	A. Garmash <i>et al.</i>	(BELLE Collab.)
ABLIKIM	05	PL B607 243	M. Ablikim <i>et al.</i>	(BES Collab.)
ABLIKIM	05Q	PR D72 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ACHASOV	05	PR D72 013006	N.N. Achasov, G.N. Shestakov	
GARMASH	05	PR D71 092003	A. Garmash <i>et al.</i>	(BELLE Collab.)
ABLIKIM	04G	PR D70 092002	M. Ablikim <i>et al.</i>	(BES Collab.)
ANISOVICH	03	EPJ A16 229	V.V. Anisovich <i>et al.</i>	
TIKHOMIROV	03	PAN 66 828	G.D. Tikhomirov <i>et al.</i>	
		Translated from YAF 66 860.		
ALOISIO	02D	PL B537 21	A. Aloisio <i>et al.</i>	(KLOE Collab.)
ANISOVICH	02D	PAN 65 1545	V.V. Anisovich <i>et al.</i>	
		Translated from YAF 65 1583.		
BRAMON	02	EPJ C26 253	A. Bramon <i>et al.</i>	
ACHASOV	01F	PR D63 094007	N.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AITALA	01A	PRL 86 765	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
AITALA	01B	PRL 86 770	E.M. Aitala <i>et al.</i>	(FNAL E791 Collab.)
ACHASOV	00H	PL B485 349	M.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
AKHMETSHIN	99B	PL B462 371	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
AKHMETSHIN	99C	PL B462 380	R.R. Akhmetshin <i>et al.</i>	(Novosibirsk CMD-2 Collab.)
BARBERIS	99	PL B453 305	D. Barberis <i>et al.</i>	(Omega Expt.)
BARBERIS	99B	PL B453 316	D. Barberis <i>et al.</i>	(Omega Expt.)
BARBERIS	99C	PL B453 325	D. Barberis <i>et al.</i>	(Omega Expt.)
BARBERIS	99D	PL B462 462	D. Barberis <i>et al.</i>	(Omega Expt.)
BELLAZZINI	99	PL B467 296	R. Bellazzini <i>et al.</i>	
BOGLIONE	99	EPJ C9 11	M. Boglione, M.R. Pennington	
KAMINSKI	99	EPJ C9 141	R. Kaminski, L. Lesniak, B. Loiseau	(CRAC, PARIN)
OLLER	99	PR D60 099906 (erratum)	J.A. Oller <i>et al.</i>	
OLLER	99B	NP A652 407 (erratum)	J.A. Oller, E. Oset	
OLLER	99C	PR D60 074023	J.A. Oller, E. Oset	
ACHASOV	98I	PL B440 442	M.N. Achasov <i>et al.</i>	
ACKERSTAFF	98Q	EPJ C4 19	K. Ackerstaff <i>et al.</i>	(OPAL Collab.)
ALDE	98	EPJ A3 361	D. Alde <i>et al.</i>	(GAM4 Collab.)
Also		PAN 62 405	D. Alde <i>et al.</i>	(GAMS Collab.)
		Translated from YAF 62 446.		
ANISOVICH	98B	SPU 41 419	V.V. Anisovich <i>et al.</i>	
		Translated from UFN 168 481.		
LOCHER	98	EPJ C4 317	M.P. Locher <i>et al.</i>	(PSI)
ALDE	97	PL B397 350	D.M. Alde <i>et al.</i>	(GAMS Collab.)
BERTIN	97C	PL B408 476	A. Bertin <i>et al.</i>	(OBELIX Collab.)
ISHIDA	96	PTP 95 745	S. Ishida <i>et al.</i>	(TOKY, MIYA, KEK)
TORNQVIST	96	PRL 76 1575	N.A. Tornqvist, M. Roos	(HELS)
ALDE	95B	ZPHY C66 375	D.M. Alde <i>et al.</i>	(GAMS Collab.)
AMSLER	95B	PL B342 433	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
AMSLER	95D	PL B355 425	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH	95	PL B355 363	V.V. Anisovich <i>et al.</i>	(PNPI, SERP)
JANSSEN	95	PR D52 2690	G. Janssen <i>et al.</i>	(STON, ADLD, JULI)
AMSLER	94D	PL B333 277	C. Amsler <i>et al.</i>	(Crystal Barrel Collab.)
ANISOVICH	94	PL B323 233	V.V. Anisovich <i>et al.</i>	(Crystal Barrel Collab.)
BUGG	94	PR D50 4412	D.V. Bugg <i>et al.</i>	(LOQM)
KAMINSKI	94	PR D50 3145	R. Kaminski, L. Lesniak, J.P. Maillet	(CRAC+)
ZOU	94B	PR D50 591	B.S. Zou, D.V. Bugg	(LOQM)
MORGAN	93	PR D48 1185	D. Morgan, M.R. Pennington	(RAL, DURH)
AGUILAR-...	91	ZPHY C50 405	M. Aguilar-Benitez <i>et al.</i>	(LEBC-EHS Collab.)
ARMSTRONG	91	ZPHY C51 351	T.A. Armstrong <i>et al.</i>	(ATHU, BARI, BIRM+)
BOYER	90	PR D42 1350	J. Boyer <i>et al.</i>	(Mark II Collab.)
BREAKSTONE	90	ZPHY C48 569	A.M. Breakstone <i>et al.</i>	(ISU, BGNA, CERN+)
MARSISKE	90	PR D41 3324	H. Marsiske <i>et al.</i>	(Crystal Ball Collab.)
MORGAN	90	ZPHY C48 623	D. Morgan, M.R. Pennington	(RAL, DURH)
OEST	90	ZPHY C47 343	T. Oest <i>et al.</i>	(JADE Collab.)
ACHASOV	89	NP B315 465	N.N. Achasov, V.N. Ivanchenko	
AUGUSTIN	89	NP B320 1	J.E. Augustin, G. Cosme	(DM2 Collab.)
VOROBIEV	88	SJNP 48 273	P.V. Vorobiev <i>et al.</i>	(NOVO)
		Translated from YAF 48 436.		

ABACHI	86B	PRL 57 1990	S. Abachi <i>et al.</i>	(PURD, ANL, IND, MICH+)
ETKIN	82B	PR D25 1786	A. Etkin <i>et al.</i>	(BNL, CUNY, TUFTS, VAND)
GIDAL	81	PL 107B 153	G. Gidal <i>et al.</i>	(SLAC, LBL)
ACHASOV	80	SJNP 32 566	N.N. Achasov, S.A. Devyanin, G.N. Shestakov	(NOVM)
		Translated from YAF 32 1098.		
LOVERRE	80	ZPHY C6 187	P.F. Loverre <i>et al.</i>	(CERN, CDEF, MADR+) IJP
AGUILAR-...	78	NP B140 73	M. Aguilar-Benitez <i>et al.</i>	(MADR, BOMB+)
CASON	78	PRL 41 271	N.M. Cason <i>et al.</i>	(NDAM, ANL)
LEEPER	77	PR D16 2054	R.J. Leeper <i>et al.</i>	(ISU)
ROSSELET	77	PR D15 574	L. Rosselet <i>et al.</i>	(GEVA, SACL)
FLATTE	76	PL 63B 224	S.M. Flatte	(CERN)
WETZEL	76	NP B115 208	W. Wetzel <i>et al.</i>	(ETH, CERN, LOIC)
SRINIVASAN	75	PR D12 681	V. Srinivasan <i>et al.</i>	(NDAM, ANL)
GRAYER	74	NP B75 189	G. Grayer <i>et al.</i>	(CERN, MPIM)
BINNIE	73	PRL 31 1534	D.M. Binnie <i>et al.</i>	(LOIC, SHMP)
GRAYER	73	Tallahassee	G. Grayer <i>et al.</i>	(CERN, MPIM)
HYAMS	73	NP B64 134	B.D. Hyams <i>et al.</i>	(CERN, MPIM)
PROTOPOP...	73	PR D7 1279	S.D. Protopopescu <i>et al.</i>	(LBL)

OTHER RELATED PAPERS

GARMASH	07	PR D75 012006	A. Garmash <i>et al.</i>	(BELLE Collab.)
ACHASOV	06B	PR D73 054029	N.N. Achasov, A. V. Kiselev	
BUGG	06A	EPJ C47 45	D.V. Bugg	
		Translated from YAF 69 542.		
CHENG	06	PR D73 014017	H.-Y. Cheng, C.-K. Chua, K.-C. Yang	
FARIBORZ	06	PR D74 054030	A.H. Fariborz	
KALASHNIK...	06	PR C73 045203	Yu. Kalashnikova <i>et al.</i>	
ROSNER	06C	PR D74 076006	J.L. Rosner	
WANG	06B	PR D74 114010	W. Wang <i>et al.</i>	
ANISOVICH	05B	PAN 68 1554	A.V. Anisovich, V.V. Anisovich, V.N. Markov	
		Translated from YAF 68 1614.		
AUBERT,B	05G	PR D72 052002	B. Aubert <i>et al.</i>	(BABAR Collab.)
BARU	05	EPJ A23 523	V.V. Baru, J. Haidenbauer, C. Hanhart	
BRITO	05	PL B608 69	T.V. Brito <i>et al.</i>	
KALASHNIK...	05	EPJ A24 437	Yu.S. Kalashnikova, A.E. Kudryavtsev, A.V. Nefediev	
LI	05B	EPJ A25 263	D.-M. Li, K.-W. Wei, H. Yu	
RODRIGUEZ	05	PR D71 074008	S. Rodriguez, M. Napsuciale	
TESHIMA	05	NP A759 131	T. Teshima, I. Kitamura, N. Morisita	
VIJANDE	05	PR D72 034025	J. Vijande, A. Valarce, F. Fernandez	
WANG	05C	EPJ C42 89	Z.-G. Wang, W.-M. Yang	
ABLIKIM	04A	PL B598 149	M. Ablikim <i>et al.</i>	(BES Collab.)
AUBERT,B	04P	PR D70 092001	B. Aubert <i>et al.</i>	(BABAR Collab.)
BARU	04	PL B586 53	V. Baru <i>et al.</i>	
BEDIAGA	04	PL B579 59	I. Bediaga <i>et al.</i>	
BUGG	04B	PL B598 8	D.V. Bugg	
LINK	04	PL B585 200	J.M. Link <i>et al.</i>	(FNAL FOCUS Collab.)
PELAEZ	04	PRL 92 102001	J.R. Pelaez	
PELAEZ	04A	MPL A19 2879	J.R. Pelaez	
WANG	04B	EPJ C37 223	Z.-G. Wang <i>et al.</i>	
ACHASOV	03E	NP A728 425	N.N. Achasov	
ANISOVICH	03B	PAN 66 741	V.V. Anisovich, V.A. Nikonov, A.V. Sarantsev	
		Translated from YAF 66 772.		
ANISOVICH	03D	PAN 66 928	V.V. Anisovich, A.V. Sarantsev	
		Translated from YAF 66 960.		
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CHEN	03	PR D67 094011	C.-H. Chen	
COLANGELO	03	PL B559 49	P. Colangelo, F. De Fazio	
PALOMAR	03	NP A729 743	J.E. Palomar <i>et al.</i>	
ACHASOV	02G	PL B534 83	N.N. Achasov, A.V. Kiselev	
ANISOVICH	02C	PAN 65 497	A.V. Anisovich <i>et al.</i>	
		Translated from YAF 65 523.		
BLACK	02	PRL 88 181603	D. Black, M. Harada, J. Schechter	
CLOSE	02B	JPG 28 R249	F.E. Close, N. Tornqvist	
KAMINSKI	02	EPJ Direct C4 1	R. Kaminski, L. Lesniak, K. Rybicki	
KLEEFELD	02	PR D66 034007	F. Kleeffeld <i>et al.</i>	
RUPP	02	PR D65 078501	G. Rupp, E. van Beveren, M.D. Scadron	
SHAKIN	02	PR D65 078502	C.M. Shakın, H. Wang	
TESHIMA	02	JPG 28 1391	T. Teshima, I. Kitamura, N. Morisita	
VOLKOV	02	PAN 65 1657	M.K. Volkov, V.L. Yudichev	
		Translated from YAF 65 1701.		

ACHASOV	01F	PR D63 094007	N.N. Achasov <i>et al.</i>	(Novosibirsk SND Collab.)
CLOSE	01	PL B515 13	F.E. Close, A. Kirk	
GOKALP	01	PR D64 053017	A. Gokalp, O. Yilmaz	
SUROVTSEV	01	PR D63 054024	Y.S. Surovtsev, D. Krupa, M. Nagy	
MARKUSHIN	00	EPJ A8 389	V.E. Markushin	
WANG	00A	PR D62 017503	Z. Wang	
ABREU	99J	PL B449 364	P. Abreu <i>et al.</i>	(DELPHI Collab.)
ANISOVICH	99D	PL B452 180	A.V. Anisovich <i>et al.</i>	
Also		NP A651 253	A.V. Anisovich <i>et al.</i>	
ANISOVICH	99H	PL B467 289	A.V. Anisovich, V.V. Anisovich	
BLACK	99	PR D59 074026	D. Black <i>et al.</i>	
DELBOURGO	99	PL B446 332	R. Delbourgo, D. Liu, M. Scadron	
MARCO	99	PL B470 20	E. Marco <i>et al.</i>	
MINKOWSKI	99	EPJ C9 283	P. Minkowski, W. Ochs	
ACHASOV	98G	JETPL 67 464	N.N. Achasov <i>et al.</i>	
ACHASOV	98J	SPU 41 1149	N.N. Achasov	
CHLIAPNIK...	98	PL B423 401	P.V. Chliapnikov, V.A. Uvarov	
PROKOSHKIN	97	SPD 42 117	Y.D. Prokoshkin <i>et al.</i>	(SERP)
Translated from DANS 353 323.				
AU	87	PR D35 1633	K.L. Au, D. Morgan, M.R. Pennington	(DURH, RAL)
AKESSON	86	NP B264 154	T. Akesson <i>et al.</i>	(Axial Field Spec. Collab.)
VANBEVEREN	86	ZPHY C30 615	E. van Beveren <i>et al.</i>	(NIJM, BIEL)
MENNESSIER	83	ZPHY C16 241	G. Mennessier	(MIONP)
BARBER	82	ZPHY C12 1	D.P. Barber <i>et al.</i>	(DARE, LANC, SHEF)
ETKIN	82C	PR D25 2446	A. Etkin <i>et al.</i>	(BNL, CUNY, TUFTS, VAND)
SRINIVASAN	75	PR D12 681	V. Srinivasan <i>et al.</i>	(NDAM, ANL)
BIGI	62	CERN Conf. 247	A. Bigi <i>et al.</i>	(CERN)
BINGHAM	62	CERN Conf. 240	H.H. Bingham <i>et al.</i>	(EPOL, CERN)
ERWIN	62	PRL 9 34	A.R. Erwin <i>et al.</i>	(WISC, BNL)
WANG	61	JETP 13 323	K.-C. Wang <i>et al.</i>	(JINR)
Translated from ZETF 40 464.				